



Traumatic Brain Injury: Overview for Law Enforcement and Public Safety Professionals

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2020



Introduction

Which one of these prominent Americans has *not* had a brain injury?

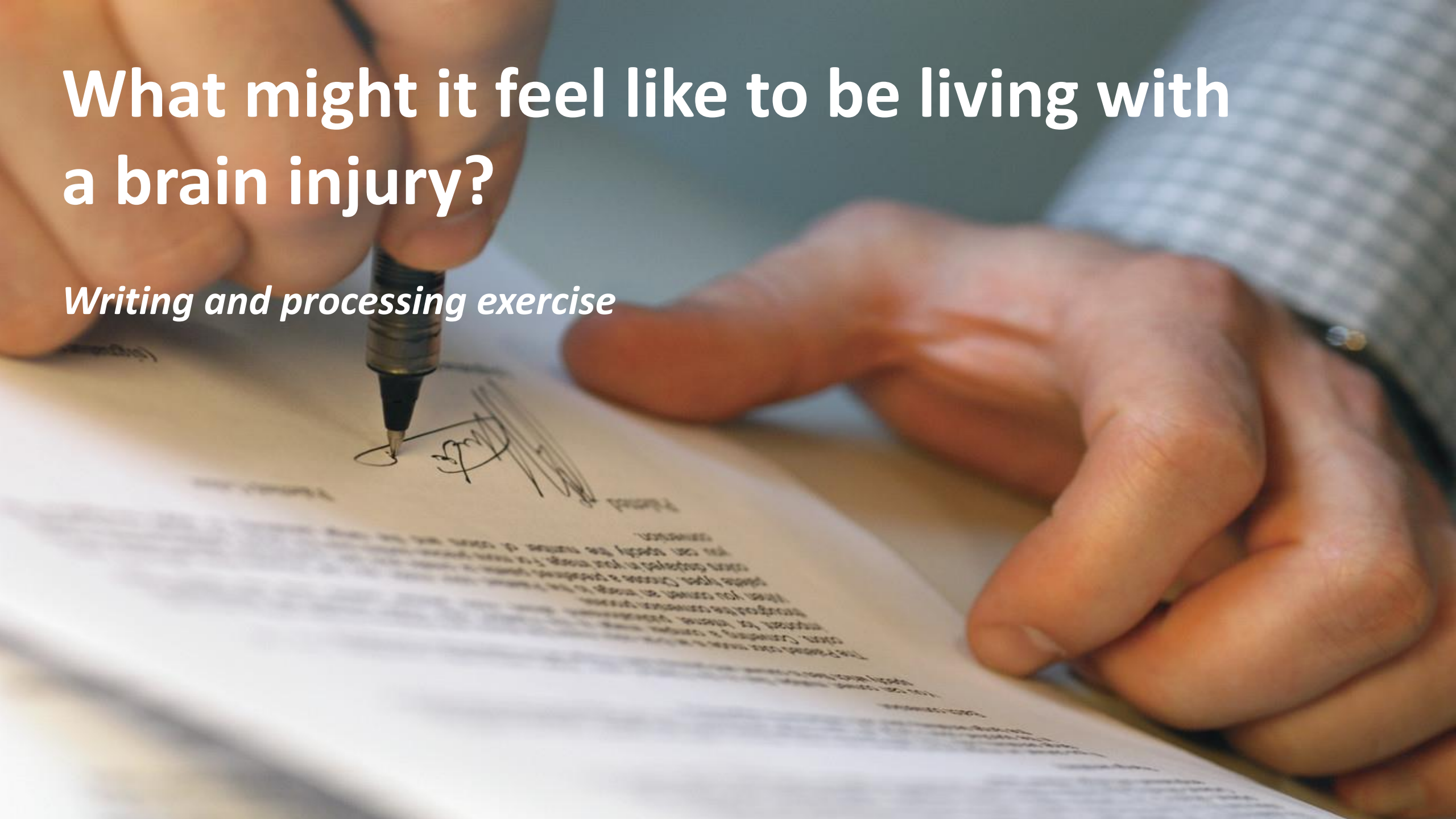
- George Clooney: Actor/director
- Ben Roethlisberger: Pittsburgh Steelers quarterback
- Anne Hathaway: Actress
- Tracy Morgan: Actor/comedian

Agenda

- The basic brain
- Who is affected?
- Types of Brain Injury
- How are people affected by Brain Injury?
- The Brain Injury/substance abuse and mental health intersection
- Tips for law enforcement professionals
- Resources

What might it feel like to be living with a brain injury?

Writing and processing exercise



The Basic Brain

What does Traumatic Brain Injury (TBI) look like?

Beyond the Invisible narrated by Lee Woodruff

- <https://youtu.be/ePIgU2LFU-g>

Also found on www.BrainLine.org

The Basic Brain

How many Americans are treated in Emergency Departments (ED), hospitalized, or die as a result of a TBI each year?

- 231,840
- 2.8 million
- 1.2 million

Source: CDC 2017

The Basic Brain

How much does the adult brain weigh?

- 7 pounds
- 3 pounds
- 1.5 pounds

The Basic Brain

At what age, on average, does the adult brain mature?

- 18
- 21
- 25

The Basic Brain

What is the last part of the brain to mature?

- Frontal lobe
- Temporal lobe
- Parietal lobe

Bonus question: The frontal lobe develops first in males or females?



Brain Injury Severity

Distribution of severity:

- **Mild injuries = 80 percent**
(Loss of consciousness (LOC) < 30 minutes, post traumatic amnesia (PTA) < 1 hour)
- Moderate = 10–13 percent
(LOC 30 minutes to 24 hours, PTA 1 to 24 hours)
- Severe = 7–10 percent
(LOC >24 hours, PTA >24 hours)

Risk Factors

Among TBI-related deaths in 2013:

- Rates of TBI were higher for persons 75 years and older—*Why?*
- Falls were the leading cause of death for persons 65 and older
- Intentional self-harm was the leading cause of death for persons 25 to 64—*Why?*
- Motor vehicle crashes were the leading cause of death for persons ages 5 to 24
- Assaults were the leading cause of death for children ages 0 to 4

Source: https://www.cdc.gov/traumaticbraininjury/get_the_facts.html

Risk Factors

Among non-fatal TBI-related injuries in 2013:

- Rates of ED visits highest for those 75 and older and children 0 to 4
- Falls were the leading cause of TBI related ED visits for all but one age group
- Being struck by or against an object was the leading cause of TBI related ED visits for those 15 to 24
- Falls were the leading cause of hospitalization among children 0 to 14 and adults 45 and older
- Motor vehicle crashes were the leading cause of hospitalizations for adolescents and persons 14 to 44 years of age

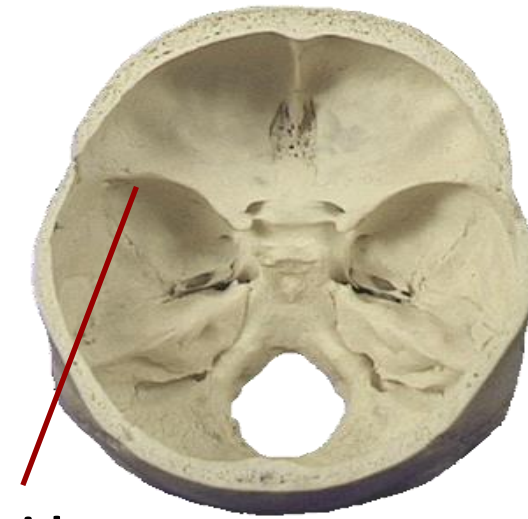
Skull Anatomy

The skull is a rounded layer of bone designed to protect the brain from penetrating injuries.



The base of the skull is rough, with many bony protuberances.

These ridges can result in [injury to the temporal and frontal lobes](#) of the brain during rapid acceleration.



Bony ridges

The Developing Brain

Please keep in mind, TBI is not the only way a young brain can be hurt.

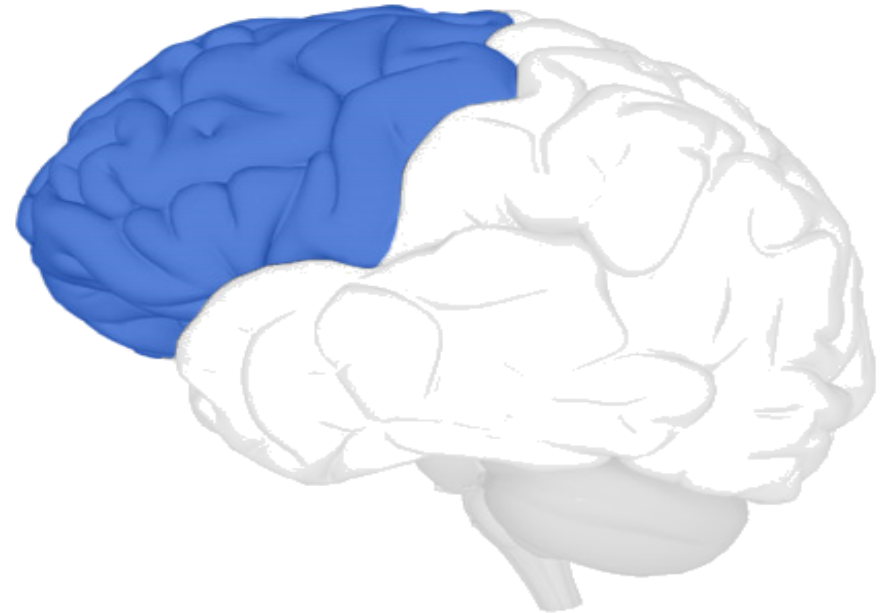
Trauma/abuse and neglect, fetal alcohol poisoning, and exposure to lead paint dust/chips can cause significant developmental and behavioral problems in kids that look perfectly “normal.”

The Frontal Lobe

The frontal lobe is the area of the brain responsible for our “executive skills,” or higher cognitive functions.

These include:

- Problem solving
- Spontaneity
- Memory
- Language
- Motivation
- Judgment
- Impulse control
- Social and sexual behavior

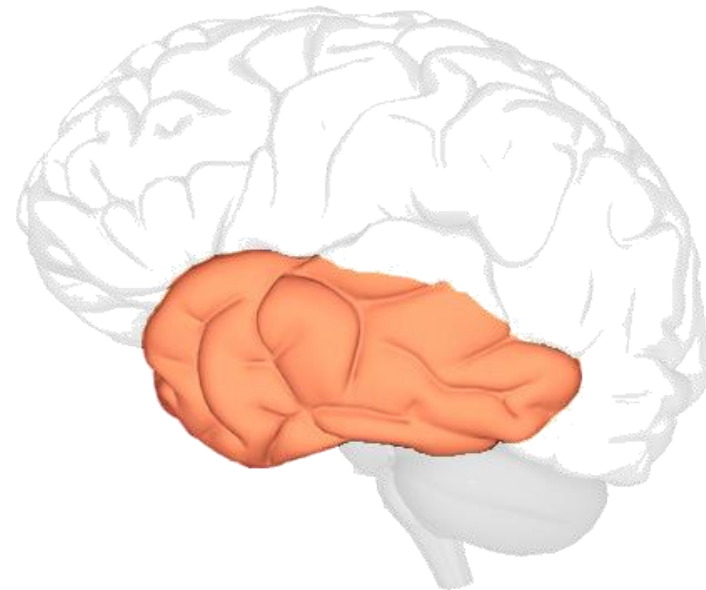


Source: Adapted from Dr. Mary Pepping of the University of Idaho's presentation "The Human Brain: Anatomy, Functions, and Injury"

The Temporal Lobe

The temporal lobe plays a role in emotions and is also responsible for smelling, tasting, perception, memory, understanding music, **aggressiveness, and sexual behavior.**

The temporal lobe also contains the **language area** of the brain.



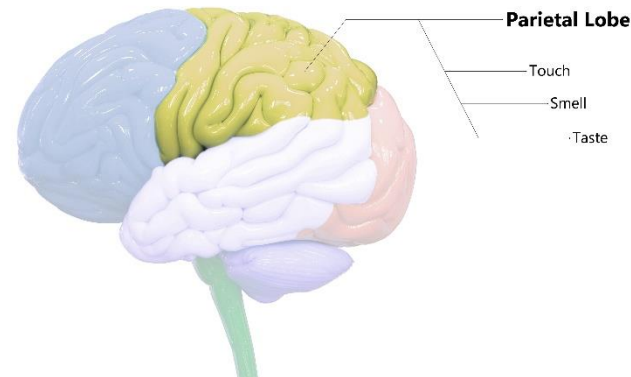
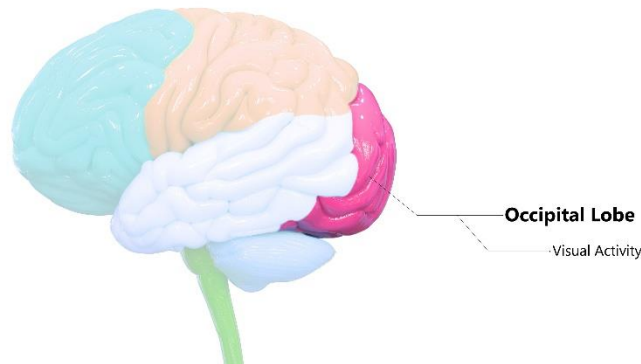
Source: Adapted from Dr. Mary Pepping of the University of Idaho's presentation "The Human Brain: Anatomy, Functions, and Injury"

TBI “Fingerprints”

There are two other lobes in the brain, the occipital and the parietal lobes.

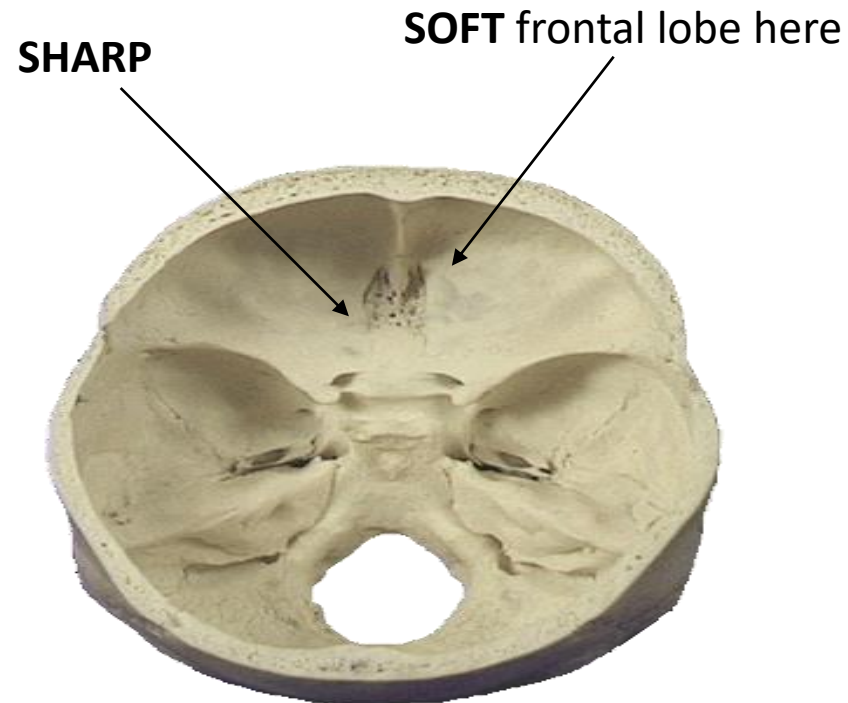
Our frontal lobe and the temporal lobes are key to managing behavior and emotions.

Thus, damage to these regions can contribute to mental health and/or addiction problems. Damage to these lobes is considered the **“Fingerprint of Traumatic Brain Injury.”**



Brain Injury

Many of our adult thinking skills reside in the frontal lobe; the frontal lobe is very vulnerable to injury.



Brain Injury

Without proper supports, brain injury can lead to mental health and addiction issues that bring people living with “hidden” TBI into the criminal justice system.

- Appropriately, structure offered by school, parents, and community fall away as children go through adolescence into adulthood. A TBI that incurred at age seven may not be fully “unmasked” functionally or behaviorally until age 11, 12, or 13 with the challenges of middle school/puberty
- The frontal lobe and temporal tips injured earlier are unable to adequately respond to the expectations of behavioral regulation and executive skill functioning

Brain Injury

According to a Christchurch, New Zealand study:

- Early childhood TBI, even if mild, may pre-dispose people to later having **behavioral problems and/or involvement with law enforcement**
- People with an early childhood TBI, that resulted in at least one night in hospital, were found to be **three times more** likely as young adults to have alcohol or drug dependency

Brain Injury

In the U.S., researchers are beginning to look at the prevalence of TBI among juvenile offenders:

- A meta-analysis of nine studies published in 2013 found approximately **30 percent** of juvenile offenders have sustained a previous TBI
- In a 2014 article in the *Journal of Adolescent Health*, newly admitted adolescents to the New York City jail system found that **50 percent** of the male juveniles and **49 percent** of the females had a history of TBI

Brain Injury

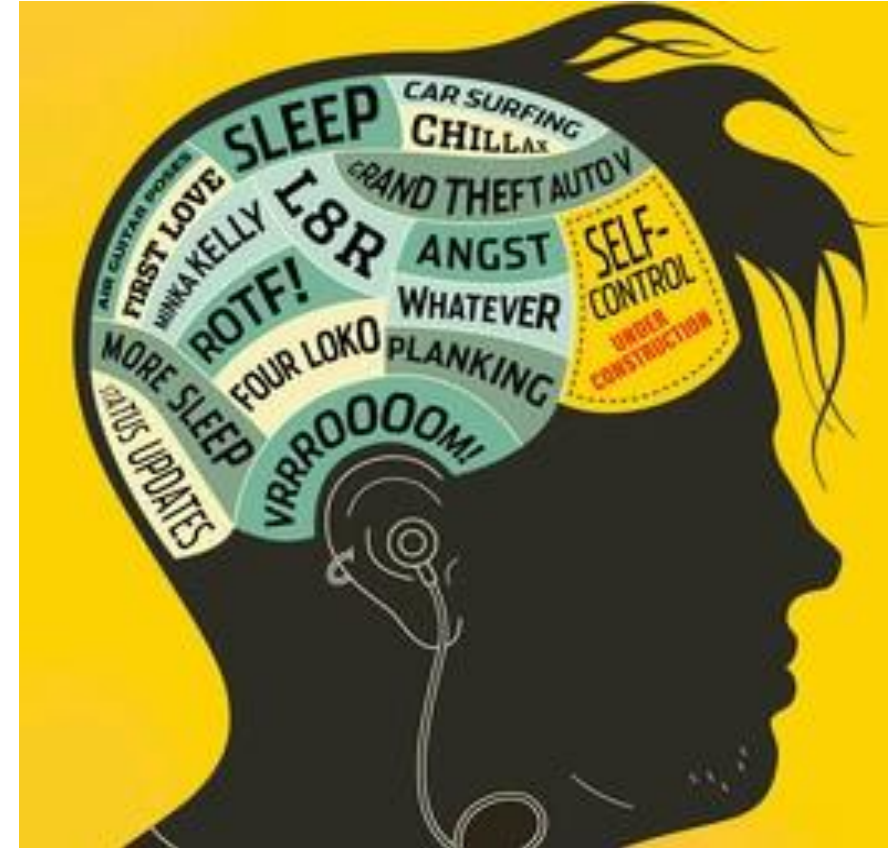
For law enforcement and criminal justice professionals, **the behavioral impact of damage to the frontal and temporal lobes can be a factor** during interactions with people who otherwise appear “normal.”

“The Surprising Connection Between Brain Injury and Crime”

Kim Gorgens - TEDxMile High

https://www.ted.com/talks/kim_gorgens_the_surprising_connection_between_brain_injuries_and_crime?language=en

Brain Injury: *Growing* into Brain Injury ...



Possible Physical Changes

Injury-related problem	How it may affect a person functionally
Coordination	Unsteady gait, poor eye-hand coordination, slow or slurred speech, tremors, paralysis
Visual Deficits	Staring or poor eye contact, blurred or double vision, inability to follow an object with their eyes
Additional Physical Challenges	Seizures, deaf or hard of hearing, fatigue

Possible Cognitive Changes

Injury-related problem	How it may affect a person functionally
Memory	Trouble following directions, providing requested information, making appointments
Processing (receptive)	Understanding what is being said and reading
Processing (expressive)	Trouble putting thoughts into words—tip of the tongue syndrome
Problem solving (related to frontal lobe and temporal tip injury)	Impulsive, easily frustrated, sexually disinhibited, verbally/physically combative, interpersonally inflexible, poorly organized

Possible Behavioral Changes

Injury related problem	How it may affect a person functionally
Depression	Flat affect, lack of initiation, sadness, irritability
Unawareness	Unable to take social cues from others
Confabulation	“Making up stories”
Perservation	Gets “stuck” on a topic of conversation or physical action
Post Traumatic Stress Disorder	Intrusive thoughts, sleep disturbance, hypervigilant
Anxiety	Can exacerbate other cognitive/behavioral problems

Post Traumatic Stress Disorder (PTSD) & Brain Injury: in civilians

- Research suggests that TBI and PTSD co-occur and that TBI is a significant predictor of the development of PTSD
- “PTSD was related to shorter posttraumatic amnesia, memory of the traumatic event, and early posttraumatic symptoms”-in other words, those with mild brain injury with little or no period of unconsciousness maybe more likely to experience posttraumatic symptoms and PTSD

Sources: Hoffman AN, Taylor AN. Stress reactivity after traumatic brain injury: implications for comorbid post-traumatic stress disorder. *Behav Pharmacol.* 2019;30(2 and 3-Spec Issue):115–121. doi:10.1097/FBP.0000000000000461.,
Cnossen MC, Scholten AC, Lingsma HF, et al. Predictors of Major Depression and Posttraumatic Stress Disorder Following Traumatic Brain Injury: A Systematic Review and Meta-Analysis. *J Neuropsychiatry Clin Neurosci.* 2017;29(3):206–224. doi:10.1176/appi.neuropsych.16090165

TBI and PTSD appear to impact parts of the brain critical to behavioral regulation such as:

- Executive skill functioning
- Memory
- Ability to respond to and manage response to fear and stress

Source: Kaplan GB, Vasterling JJ, Vedak PC. Brain-derived neurotrophic factor in traumatic brain injury, post-traumatic stress disorder, and their comorbid conditions: role in pathogenesis and treatment. *Behav Pharmacol.* 2010;21(5-6):427–437. doi:10.1097/FBP.0b013e32833d8bc9

Post Traumatic Stress Disorder (PTSD) and TBI: The Similarities

- Sleep disturbances
- Irritability
- Physical restlessness
- Difficulty concentrating
- Some memory problems

Source: *Invisible Wounds: Serving Service Members and Veterans with PTSD & TBI* National Council on Disabilities

<https://ncd.gov/publications/2009/March042009>

Post Traumatic Stress Disorder (PTSD) and TBI: The Differences

- For individuals with PTSD only-memory for event may be impaired but otherwise memory **AND** the ability to learn is intact
- For individuals with TBI only-older memories are preserved, but have difficulty retaining **NEW** memories and new learning
- Some physical symptoms associated w/TBI: headaches, dizziness, sensitivity to noise, light, vertigo

Source: *Invisible Wounds: Serving Service Members and Veterans with PTSD & TBI* National Council on Disabilities

<https://ncd.gov/publications/2009/March042009>

Other Clues

- You may observe scars on an individual's forehead, neck, face
- The individual is using a cane, walker or wheelchair
- The individual has a limp or appears to drag one foot when walking

Recognizing Brain Injury*

Misunderstandings between individuals and law enforcement related to a history of brain injury-example:

A 22-year-old man who had recovered well physically from the last of three TBIs in his history has a potentially volatile interaction with an officer due to severe receptive processing/aphasia

*Optional, see scenario in the Train the Trainer Manual

Recognizing Brain Injury

“Unidentified traumatic brain injury is an unrecognized major source of **social and vocational failure.**”

(To this, we can add educational failure.)

Recognizing Brain Injury

People with TBI are over-represented:

- Among the incarcerated
- Among the homeless
- In addiction services
- In mental health services
- Among those who serve/have served in the Armed Forces*
- Athletes—professional and amateur

*Most service-related TBIs are not combat-related; they occur during training exercises, and during accidents on and off base

Recognizing Brain Injury

People with a history of TBI are at risk of:

- Developing psychosis
- Suicide
- Being unemployed or underemployed

Substance Abuse

Updating the “fingerprint” of Brain Injury—hypoxic-ischemic damage from a lack of oxygen to the brain:

- Overdosing on opiates suppresses or stops breathing, denying oxygen to the brain
- NO oxygen to the brain = anoxic brain damage
- REDUCED oxygen to the brain = hypoxic brain damage
- Cell death begins in the brain after only five to six minutes of oxygen deprivation
- Move overdoses in which a person survives likely cause hypoxic and anoxic brain damage

Substance Abuse

Updating the “fingerprint” of Brain Injury—hypoxic-ischemic damage from a lack of oxygen to the brain (*continued*):

- Sudden loss of oxygen to the brain has the greatest effects on parts of the brain that are high oxygen users such as the hippocampus, basal ganglia, neocortex, cerebellar Purkinje cells, primary visual cortex, frontal regions, and thalamus
- Most common cognitive impairment: Memory, attention, **mental processing speed**, executive functioning, visual spatial skills, and motor coordination
- Emotional dysregulation also occurs: **Lability, impulsivity, irritability, and apathy**
- The impact of executive functions—particularly self-regulation—is very similar to the impact of **TBI**

Source: John Corrigan of the Ohio Brain Injury Program

Substance Abuse

Updating the “fingerprint” of Brain Injury—hypoxic-ischemic damage from a lack of oxygen to the brain (*continued*):

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Alcohol Intoxication (AI), TBI & overlapping signs

<i>Signs of AI only</i>	<i>Overlapping signs</i>	<i>Signs of TBI Only</i>
Staggering or unsteady walking	Slurred speech	Uneven but consistent walking
Odor of alcohol	Sudden mood change	Scars on head
Eyes are red	Poor balance	Irritable
Overly friendly, giggly	Nystagmus (rapid, involuntary movement of eyes)	Distractible
	Slow to answer questions	Weak, breathy voice
	Anger outbursts when provoked	
	Poor memory	
	Miscalculating depth or distance	
	Poorly coordinated movements	

Violence

Domestic violence:

- People who are victims of domestic violence often have brain injuries from hitting, choking, etc.
- Studies have suggested the perpetrators are also likely to have a history of TBI
- It is difficult for those who have been abused, especially over a long period of time, to organize a plan to leave, due not only to emotional distress and economic considerations, **but also because the parts of their brains responsible for planning, organizing, and remembering have been damaged.** Victims may have impulse control problems themselves. *“She gives as good as she gets”*

Simple Engagement/De-Escalation Strategies for Officers

- Make and maintain eye contact during interactions
- Speak in short, simple sentences
- Speak in a neutral tone
- Ask the person to paraphrase what you have said frequently
- Give the person time to process what is being said
- When possible, give the person a “heads up” regarding what to expect during your interaction

Simple De-Escalation Strategies

- Behavior-specific praising: Reinforce the positive behaviors you see—
“I like how you are sitting here talking to me”
- Redirection
- Choose your battles. . . only focus on what matters
- Non-verbal cues (including tone of voice) **will be interpreted first**

Source: Joelle Ridgeway, MS

Simple De-Escalation Strategies

Positive prompting—don't give attention to negative behavior and don't sound authoritative:

- Person becoming distracted—*“We are almost finished here, thank you for sitting here talking to me”*
- Person is yelling at you or someone else—*“Lower your voice please”*
- Person hitting fists on car/wall—*“Let's walk over here”*

Source: Joelle Ridgeway, MS

Simple Escalation Strategies

Positive prompting—don't give attention to negative behavior and don't sound authoritative (*continued*):

- Person has something in their hands that they could hurt themselves with—*“Please put the bat over here”*
- Person grabs your arm—*“Please keep your hands to yourself”*

NOTICE how **concrete and specific** these examples are

Source: Joelle Ridgeway, MS

The Lookout *

Watch this scene from the 2007 movie *The Lookout*:

- What are the character's **barriers**?
- What are the character's **strengths**?
- What are the strategies he is **using to compensate**?

*Optional, on the DVD menu "four years later"

Living With Brain Injury

What is recommended to people with BI and their families & supporters

- Wear a Medical Alert bracelet or necklace that is visible
- Review importance of what is considered personal space boundaries
- When in a car, keep an information card in the visor
- Keep a card with words and phrases that can be used to describe disability in wallet
- Partner with local law enforcement agencies

(suggested to BI advocacy groups & community Brain Injury Service providers)

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Office of Acquired Brain Injury

Brain Injury Survivor Wallet Card

A person with a brain injury can carry this wallet card to help avoid misunderstandings with law enforcement, first responders and others. The card includes contact information, common signs and symptoms of brain injury and a request to call a designated emergency contact if needed.

Instructions:

1. **Download wallet card (PDF).**
2. Print wallet card.
3. Write information on card.
4. Trim card along edges. Card may be laminated to make sturdier.

If you are having trouble printing the card or would like to have one or more in a heavier weight of

FRONT

I AM A BRAIN INJURY SURVIVOR

Name: _____

Address: _____

Telephone: _____

Emergency Contact: _____

Emergency Phone: _____

**PLEASE READ REVERSE SIDE****BACK**

SYMPTOMS OF A BRAIN INJURY MAY INCLUDE:

- Poor coordination and balance
- Slurred speech
- Impaired vision or hearing
- Difficulty concentrating
- Difficulty understanding
- Memory problems
- Aggressive behavior
- Confusion
- Dizziness
- Delayed thought processing
- Irritability or impatience
- Impaired judgment
- Inappropriate behavior
- Impulsivity

Please communicate in a calm, non-confrontational manner. If you

Resources

- **Brain Injury Association of Maryland:** www.biamd.org, 410-402-8478

Offers Maryland citizens information about brain injury and where to find help and treatment

- **Brainline:** www.brainline.org

Funded through the Defense and Veterans Brain Injury Center, Brainline offers civilians and returning service members with Brain Injury, families, and professionals a variety of information and resources regarding life after Brain Injury

Thank you

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410-402-8478

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